A Review of the Impacts and Benefits of Human-Animal Relationships

An Honors Thesis (HONR 499)

by

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Abstract

Animals, both domestic and non-domestic, have played a crucial role in our social history for thousands of years. They appear in myths and literature dating from the prehistoric times to the present, and are vital to human culture, economy, and psychology. A review of the existing literature has found that domestic animals and humans can confer many mutual physiological benefits to one another through stress reduction. Non-domestic animals in both zoos and in the wild present similar benefits to humans. Interaction with wild animals also increases interest in education and conservation, which are now key elements to the survival of many endangered species.

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Introduction

Humans have long had an outstanding fascination with non-human animals. Cave paintings in Lascaux, France, dating to 17,300 years ago, depict cattle, horses, stags, and other fauna that were native to the area (UNESCO 2015). The Egyptians revered species such as cats, jackals, and hyenas and turned them into gods, attributing human qualities to them. The Greek storyteller Aesop used depictions of animals in order to tell stories that conveyed moral lessons. An important Roman myth is the story of Romulus and Remus, two twins that were raised by a she-wolf, and who eventually went on to found Rome, beginning the great empire. Over thousands of years, humans have domesticated animals into the dogs, cats, horses, cows, pigs, and other livestock that we know today, turning them into resources and companions. These animals, however, are not only good for their commercial value; the psychological and emotional benefits of keeping these animals have been well-recorded, but they are not the only animals with which people desire interaction. Today, we also keep wild and exotic animals—some of which may have formerly been our predators—in zoos, circuses, and other attractions. But why do we keep them? What benefits can they confer to us, and what benefits can we confer to them?

It is easy to see that animals are important to us on a cultural and psychological level, as evidenced by their heavy involvement in our history, but it now has been shown that benefits can exist on the physiological level and can improve our own physical health and welfare. However, this influence is not unidirectional; our attitudes towards these species influence their well-being and existence, and can have great impacts on the futures of these animals. The current era is considered by many to be the Anthropocene due to the overwhelming effects that humans have had on the earth (Zalasiewicz et al. 2008). Not only have humans spread over the globe, but entire ecosystems have been drastically changed as a result of the spread of human civilization,

and even the atmosphere has had an unprecedented increase of carbon dioxide (Steffen et al. 2007). Deforestation, overhunting, and pollution are considered major threats to existing ecosystems, and dozens of species have become extinct as a direct result of human activity (Diamond et al. 1989). However, these animals play a crucial role in human health and culture, and without them, our own existence would be drastically altered. We, too, are animals and although we have attempted to elevate ourselves from the status of "just animals" by way of cultural, linguistic, and intellectual differences, we depend on other species. Because humans are animals as well, the term "non-human animals" will be used in this discussion to distinguish interactions that may occur within our species from interactions that occur between our species and the other species with which we coexist.

Cultural Importance

A great deal about the cultural importance of non-human, non-domestic animals can be learned from examining the stories that permeate society. Folk tales and literature are often said to reflect a society's ideals, realities, and fears. These tales can reveal aspects of reality, perceptions of the environment, interests and fixations, moral ideals, and concerns about the present (Albrecht 1954). It is also theorized that literature and folklore may influence these social characteristics, and not merely imitate them (Albrecht 1954). In either case, this suggests that the occurrence of non-domestic animals in these mediums can shed light on the value of relationships between humans and animals in the culture and time being represented. The motif index developed by Stith Thompson, which catalogues common themes that occur in literature and folklore worldwide, contains over 2000 entries relating to animals (Thompson 1955). These motifs emphasize the many roles that animals, both domestic and wild, have been given throughout history, as gods, predators, caretakers, and bearers of magic. The social and cultural

influence that these common themes evoke often places non-human animals in positions other than predator or prey, which are the relationships that most of the animals would have with us in a strictly ecological sense.

For example, one motif is that of "helpful wild beasts," a category which itself can be narrowed to "animals that nourish man," and, finally, "she-wolf cares for baby exposed in forest" (Thompson 1955). This motif can be recognized in the story of Romulus and Remus, founders of Rome, but also in more modern tales, such as *The Jungle Book*, a series of short stories by Rudyard Kipling in 1894 that has been adapted to other forms of media, including children's movies. The stories are written as fables, with the tales and behavior of the animals giving insight into behavior and moral propriety. The animals in *The Jungle Book* are anthropomorphic, depicted as having human qualities that enabled them to communicate with each other and experience their own problems, conflicts, and resolutions. Although not all the stories are focused on the "man-cub" Mowgli, many of them are. These stories tell the tale of a young boy who was stolen away by the hungry tiger Shere Khan, but was rescued by a pack of wolves led by Akela (Kipling 1894). Mowgli is educated about the ways of the jungle by the bear, Baloo, and the panther, Bagheera, who remain his friends even after Mowgli's eventual exile from both the wolf pack and the human tribe in which he was born. During his adventures, Mowgli encounters a group of lawless monkeys, a self-interested snake, and the bloodthirsty Shere Khan, who is eventually killed (Kipling 1894). Some of the animals like the monkeys and the tiger are depicted negatively, while others are nurturing and helpful. Borkfelt (2009) remarks that while the animals are often interpreted as metaphors for human events and issues, depictions of beasts in literature such as this can ultimately influence and shape our perceptions of the animals. While the positive stereotypes that are shown can create a deeper relationship with these animals, the

corresponding negative stereotypes could create antipathy towards these creatures. The depiction of the tiger in *The Jungle Book*, for instance, reflects a cultural bias against tigers that extended back to works by Shakespeare. The continuation of this stereotype by Kipling not only reflected cultural feelings toward this species, but possibly influenced and encouraged them during his time (Borkfelt 2009).

Other depictions of relationships between humans and non-human animals in historical literature likely could have had a similar effect. Edgar Rice Burroughs' 1912 *Tarzan* series also depicts a human living among wild animals as he is raised by a fictional African ape species known as the Mangani. Like *The Jungle Book*, this story has been adapted many times into different media, including movies and television series. Perhaps its endurance derives from the continuation of a cultural fascination with wild-men, the natural world, and the capabilities and existence of exotic animals. It is important to recognize that the popularity of this tale also means that the story, in its many iterations, has had the opportunity to influence generations of people and their perceptions of wild animals. However, there are an endless number of other folktales, novels, and stories from all periods of history that prominently feature animals, wild and domestic alike, in important roles. These stories may take many different forms; some are from the perspective of the animal, while others feature a human as the protagonist. In some stories, such as *The Jungle Book*, the animals possess human characteristics or consciousness. Other tales may feature a more realistic portrayal. Jack London's *White Fang* follows a non-anthropomorphic wolf hybrid as he struggles in his natural environment and with the humans who take advantage of him (London 1906). Often these roles are highly symbolic, such as the white whale in *Moby Dick* by Herman Melville (1851). These are a small fraction of stories that demonstrate the cultural importance that non-human animals play in our lives. The prevalence of

animals in the global literature, dating back to the earliest cave paintings, earliest societies, and in modern tales illustrates the importance that these animals, as either literal beings or metaphorical ones, play in our lives. However, beyond an intense fascination with these creatures, it is important to consider the other ways in which we relate to non-human animals.

Scientific Evidence

Domestic Interactions

Much research has been conducted regarding the physical and mental impacts that domestic animals, mostly pets such as dogs and cats, have on human health and welfare. According to anthropological evidence, dogs have been domesticated for at least 14,000 years as companions for hunting and security (Galibert et al. 2011), but during the Middle Ages and increasingly through the following centuries, dogs and other animals, such as cats, gained popularity as social companion animals and status symbols (Walsh 2009). This trend increased over time, and in 2012, 36.5% of American households owned dogs, while 30.4% owned cats. Additionally, 63.2% of pet owners considered their pet to be a family member (U.S. Pet 2012). The increasing amount of money spent on pets also suggests that these domestic companion animals have become more emotionally valued (Walsh 2009), but this in itself does not specifically answer whether or not there are physical and mental benefits to keeping pets.

Other recent studies, however, have suggested that there are many physical benefits to interacting with a pet. These include lowered stress responses, such as decreased blood pressure and triglycerides levels (Walsh 2009). There is also a decrease in the levels of cortisol and other stress hormones after interacting with a pet (Beetz et al. 2012). Significantly, in the half hour following interaction with a dog, the levels of oxytocin, often cited as a happiness, bonding, and love hormone, increased; levels were even more elevated when petting a familiar dog than when

petting an unfamiliar one. Oxytocin also increased with both physical contact and with eye contact, and more significantly in women than men (Beetz et al. 2012). Similarly, Nagasawa et al. (2015) found a mutual rise in oxytocin between dogs and their owners after prolonged eye contact, and that female dogs which were given oxytocin held their gazes longer. This study also found that these effects did not occur between humans and hand-raised wolves, suggesting that the coevolution of humans and dogs has made these physiological reactions possible and allowed for bonding between the two species (Nagasawa et al. 2015). These effects could be why pet ownership correlated with a higher chance of survival after a heart attack by nearly 20%, even when other factors such as severity were adjusted for (Walsh 2009; Friedmann 1995). The reduction of heart health risk factors such as triglyceride levels were more pronounced in male pet owners than in female pet owners (Friedmann 1995).

Other physical benefits can be attributed indirectly to long-term pet ownership, because it inspires life style changes, such as increased exercise, that benefit overall health (Walsh 2009). However, physical changes are not the only benefits that have been associated with frequent interaction with animals. It has been found that pets can help combat depression and lessen the severity of mental and developmental conditions (Walsh 2009) while also having a positive effect on the learning capabilities of children (Beetz et al. 2012). Additionally, interaction with pets has been connected to increased social interaction with other people, increased trust, greater empathy, lower aggression, decreased severity of depression, and decreased levels of perceived pain in the chronically ill (Beetz et al. 2012). Different mechanisms for these benefits have been proposed. One hypothesis is that animals may reduce the impact of situations that cause "fight or flight" stress responses, preventing these physiological events from taking place (Friedmann

1995). Additionally, if these responses are triggered, interaction with pets may provide a physical outlet that allows the body to more rapidly return to normal levels (Friedmann 1995).

The humans are not the only individuals to gain benefits from these relationships. It was found that the effects of these interactions and affections can be observed in not only the owner, but the pet itself, conveying benefits to both. The animals involved in the stress studies were found to have experienced a decrease in the presence of the stress hormone cortisol similar to those experienced by the owner (Beetz et al. 2012). Not only were stress hormones decreased, but oxytocin levels were increased as well in domestic dogs. As with the human participants, these changes occurred through both physical touch and eye contact (Beetz et al. 2012; Nagasawa 2015). Oxytocin increases were found in domestic dogs kept as pets, but were not found in captive, hand-raised wolves, suggesting that these benefits developed from a coevolutionary history with humans (Nagasawa 2015). It was found that pets may gain other benefits from interaction with humans (Douglas 2005). Beyond having nearly every basic need met, including food, shelter, and water, it was found that pets often receive material and psychological care that extends beyond the basics. Some of these benefits included material stimulation, such as food and toys, as well as physical affection. These behaviors of pet owners have been found to have immediate physiological effects on the animals by lowering stress responses and increasing attachment (Douglas 2005).

Similar connections have even been found in commercial domestic species. Although these species are not traditionally regarded as pets, and do not typically receive the same level of interaction or affection that pets do, it was found that they react similarly to positive interaction. In instances in which cows were subject to negative interaction, such as the use of force, they were much less likely to willingly approach the researchers. These animals produced less milk

overall than animals that had positive experiences such as patting or stroking rather than slapping and force, and the milk itself contained higher levels of the stress hormone cortisol than milk obtained from cows that experienced more positive interaction. Additionally, the cows that experienced more stressful, negative interactions had lower rates of successful conception (Hemsworth et al. 2013). Unfortunately, it has been found that most domestic species experience fear while interacting with humans, often because negative interaction, including restraint, is the main method of handling. Many times, the increased stress levels can result in the animals exhibiting injurious behavior, and reduced growth and production by cows, chickens, and pigs (Waiblinger et al. 2006). Pigs, for instance, were found to experience an increase in adrenal weight that negatively impacted their growth patterns (Gonyou et al. 1986). Similar physiological effects were noted in other species, but it was also found that animals, such as foxes and mink, which were handled in a positive way and had been selected for tameness, had reduced stress activity by the endocrine system, and greater reproductive success (Plyusnina et al. 1996).

Researcher Interactions

While it is the reputation—and the ideal—that research scientists are impartial, it is difficult for many individuals in this position to maintain complete distance from the animals that they care for and interact with on a regular basis. Jane Goodall, who is renowned for her work with the chimpanzees of Gombe, reflected that when she began her research, she intended to keep herself detached from the animals that she was studying. Over time, however, they grew to trust her and she developed relationships with these animals and became familiar with the personalities of each individual chimpanzee. Instead of numbering them, she had named them, and when they grew ill or died, she felt sorrow (Goodall 2010). However, some research

suggests that this is not entirely unusual or unethical. Surveys given to caregivers and veterinarians that were not directly involved in research on the animals revealed that many of them took those positions in order to be involved with animals, and that these interactions greatly increased job satisfaction (Chang and Hart 2002). Bayne (2002) hypothesizes that these relationships develop because of the close, repeated interactions between the subject and the researcher, even if the attachment is not reciprocated by the subject. Relationships similar to those between an owner and pet may occur because, despite the setting, the interactions are often the same. It is noted, however, that this familiarity may influence the laboratory animals because a known caretaker may reduce stress experienced by the animal, increasing its welfare. Bayne (2002) recommends that these relationships should be encouraged in order to increase the welfare of not only the animals, but the workers as well. Other research also concludes that the former ideals based on complete objectivity are not necessarily more beneficial because the formation of human-animal bonds can have positive ethical implications by increasing the welfare of the animals and creating accountability for treating these animals with respect (Russow 2002). In contrast, Herzog (2002) acknowledges that the development of relationships between researchers and their subjects creates ethical and emotional concerns, especially in cases in which the animals must be sacrificed during the course of the study. It is suggested that the institutions should have mechanisms to help involved individuals cope with such circumstances by allowing researchers to take an active role in ethical considerations.

Zoo Interactions

Research has also been conducted on the relationships between guests and animals in zoological institutions and how these influence attitudes towards wild animals and conservation. A review of surveys given to guests at these establishments found that the primary benefits that

guests sought by attending was education, family togetherness, and enjoyment and appreciation of wildlife. This study concluded that these were psychological gains of visiting the zoo (Tomas et al. 2002). Other surveys indicate that most people consider conservation to be the primary function of a zoo and that attitudes towards animals differ between people who were in zoos and those who were not in a zoo. People surveyed in the zoo generally responded more positively in regards to the animals, while infrequent visitors surveyed outside of the zoo typically thought that animals within the zoo were unhappy. The researchers concluded that the messages that visitors received within the zoo influenced their perception of the zoo animals (Reade and Waran 1996). Swanagan (2000) found that guests who had viewed an interactive demonstration with elephants were more likely to commit to conservation efforts by returning solicitation cards given out by the researchers. The results suggest that active experiences in the zoo are more likely to elicit conservation support from visitors than passive experiences (Swanagan 2000). In a study involving the effects of research and training demonstrations, visitors who viewed either demonstration type reported a greater understanding of how the zoo cared for its gorillas and the involvement the zoo had in conservation efforts. Visitors also reported having a greater interest in apes after viewing a demonstration. Additionally, it was found that research demonstrations had a greater impact on learning by children than did the training demonstrations (Price et al. 2015). Other methods can also be used to increase the interactivity of exhibits. When educational touchscreen games were placed near primate exhibits, it was found that younger visitors gained greater knowledge and interest in primate psychology (Whitehouse et al. 2014). Another factor that can influence how visitors perceive certain species is the visual design of the exhibit. Lukas and Ross (2014) compared surveys from two different chimpanzee exhibits. One exhibit design was defined as being more naturalistic and a better imitation of a chimpanzee's natural

environment. The study found that while the naturalistic exhibit did not necessarily lead to visitors being more knowledgeable than visitors at the other exhibit, the visitors were more likely to be emotional towards the chimpanzees and less utilitarian in their attitudes about the species (Lukas and Ross 2014).

It is also thought that zoo animals can benefit from the presence of or interaction with guests. Claxton (2011) suggests that relationships and interactions between humans and animals can serve as a form of environmental enrichment. In zoos, it is necessary to provide stimulation for the animals to increase their welfare. It is important to minimize abnormal behavior and increase opportunities for instinctive behavior. This is usually achieved through habitat design as well as introducing varied feeding and play mechanisms. However, training and other interaction between zoo animals and keepers can be used to create positive behaviors that can benefit both the keepers and the animals by making necessary procedures into voluntary behaviors (Claxton 2011). In these relationships, it seems that predictability and constancy were the most important factors in reducing stress and anxiety. A study involving captive clouded leopards found high cortisol levels associated with stress in animals that were tended by a large number of keepers. Leopards that were tended by fewer, more familiar keepers produced lower levels of cortisol (Wielebnowski et al. 2002).

This has raised many questions about the effects that variable, unfamiliar zoo guests may have on captive exotic animals. Although familiarity is thought to be an important factor in reducing stress to captive animals, the idea of variability and novelty in an animal's environment is one that is utilized when designing enrichment, and is considered useful in reducing negative stereotypical behaviors in zoo animals. For instance, it was found that voles displayed fewer negative behaviors in cages that were enriched by toys and other elements, even if the cages

were small in size (Odberg 1987). In baboons, inactive and negative behavior was significantly reduced after the introduction of new and variable toys to their environment (Brent and Belik 1997). Claxton (2011) recommends that further research should be done in this area in order to determine whether novelty or familiarity of humans have a larger impact on the enrichment and welfare of captive exotic animals. Overall conclusions are difficult to derive because different taxa were found to often display different reactions to visitors (Claxton 2011). While many lower primate species were found to show increased signs of stress when exposed to more guests (Chamove et al. 1988), chimpanzees were more positively interested and interactive with guests (Cook and Hosey 1995). Conversely, large cats, which typically are inactive for large portions of the day, often seemed indifferent to guests near their exhibit (Margulis et al. 2003), although this also produced inconsistent results. Quadros et al. (2014) conducted a study analyzing the effects that visitor-generated noise had on 12 different mammal species. It was found that noise pollution increased as the number of observers increased and was especially problematic at the more popular exhibits. Half the animals showed signs of agitation as noise levels increased, including higher vigilance and more movement. Due to the potential impact on animal welfare, education of visitors and exhibits designed to reduce noise stress on the animals are recommended solutions (Quadros et al 2014). It seems that the effects that zoo visitors have on the captive animals depend on the species being observed, as well as the behavior of guests and the design of the enclosure.

Wildlife Interactions

Much of the research that applies to pets or even captive non-domestic species seems inapplicable to wild animals, because the benefits derived from pets are often due to repeated direct social and physical contact, which is possible because domestic species have been bred to

be friendly towards humans. Some research, however, is now being conducted in regards to human relationships with non-captive animals. Much of this focuses on peoples' perceptions of wild animals, and the potential effects that these attitudes may have on human well-being and animal conservation. These relationships and perceptions can be complicated, especially in places where wildlife clashes with human lifestyles. Bjerke and Kaltenborn (1999) conducted surveys that indicated that there was a contrast in how anthropocentric views and ecocentric views affected perceptions of large carnivores, including wolves, bears, wolverines, and lynxes. Sheep farmers that were interviewed had high anthropocentric scores and low ecocentric scores, while also displaying a negative attitude towards these carnivores that can often pose a threat to their livestock. Wildlife biologists that were surveyed scored high on the ecocentric scale and often had a positive attitude towards large carnivores. These results indicate that perceived or actual threats to human interests attributable to wildlife have a large impact on attitudes towards these animals (Bjerke and Kaltenborn 1999).

Kellert and Berry (1987) found that perceptions of wildlife and recreational interaction with wildlife are greatly influenced by gender. Females were much less likely to be involved with activities such as hunting, trapping and fishing, but were more involved in bird feeding, bird watching, and visiting zoos. It was concluded that females valued animals as objects of affection, while males had more utilitarian views of wildlife and valued them as food or sport resources. The authors recommend that future analyses of attitudes towards wildlife should consider gender, and that efforts to increase the effectiveness of wildlife management must account for the ways in which gender influences perception and recreation (Kellert and Berry 1987). Regardless of gender biases, it was found that social attitudes towards wildlife are changing, and that is largely due to socioeconomic patterns. Increasing education, economic station, and

urbanization have led to a shift in values that emphasize actualization and expression over material well-being. In turn, this has allowed for a shift away from management values that focus on the benefits of wildlife to humans, and towards a style that emphasizes the intrinsic value and need for wildlife. It is suggested that understanding the relationship between lifestyle and attitudes towards wildlife will aid in developing management styles that coincide with local views (Manfredo et al. 2003).

It has been found that interaction with nature in general, and not just with the animals in that setting, can bestow physical, mental, and spiritual benefits to people. Physical benefits include lowered stress symptoms, such as reduced cortisol levels and heart rates while in a natural setting. The mental benefits manifest themselves as reduced symptoms of conditions like ADD and depression. These interactions do not necessarily include animals, but they do emphasize the importance of natural elements to human interests and health (Keniger et al. 2013). It has become increasingly popular to want to interact with or view animals in their natural environment, combining these benefits. Because of this, "eco-tourism" and "wildlife tourism" are growing industries, both economically and as a subject of research.

The most common form of wildlife tourism is bird-watching. Like other forms of tourism, this activity has been shown to have both positive and negative impacts for people and the environment (Sekercioglu 2002). The revenue that bird-watching brings to communities encourages local protection of the birds' habitat, and the activity fosters an understanding of the environment and the need for biodiversity that ultimately could benefit wildlife. However, the increase in the number of people in these natural environments can create problems. There is concern that the presence of people may disrupt the natural behavior of the birds by causing stress, approaching too closely, and by playing recordings that may interfere with

communication. Additionally, pollution is often a problem in areas with a high volume of visitors. It is thought that these negative impacts can be reduced by encouraging and enforcing guidelines about garbage disposal and interaction with the birds (Sekercioglu 2002). Humans can induce stress that interferes with feeding and mating patterns in species other than birds as well. People are often tempted to feed wildlife in order to get a closer encounter with the animal, but this can cause problems by interrupting natural feeding patterns as well as causing the animals to become habituated or to associate humans with food. This can endanger both the animal and people by making the animals dependent on people, less fearful of people, or more aggressive towards people (Orams 2002).

In spite of these problems, proper management should minimize the negative impacts while increasing the positive effects, especially conservation awareness (Kurleto 2014). However, there is concern that the management may not always be conducted in the most harmonious way because the wildlife tourism business requires a degree of financial sustainability. Tourists would have certain expectations about the conditions and the animals seen (Kurleto 2014). The benefits of a properly managed experience, though, can resonate with the people and the animals. The emotional and mental fulfillment gained, as well as the appreciation of the need for conservation, can ultimately benefit all groups (Kurleto 2014). For instance, it was found that tourists that participated in a marine wildlife tour gained knowledge of the environment and ecosystem, and immediately felt that they were more interested in and supportive of conservation efforts, as well as being more emotionally invested in them. It was also noted that these tourists intended to become involved in long-term efforts to aid conservation in the area that they toured (Zeppel and Muloin 2008). Ballantyne et al. (2007) proposes that the wildlife tourism industry should begin to reflect the modern management of

zoos and aquariums, which now have an intense focus on education and conservation. It is suggested that natural, direct encounters have a greater emotional and intellectual impact on individuals than indirect experiences, thus making these encounters beneficial for the purposes of education and increasing interest in conservation. Often, wildlife tours emphasize education in order to reflect the success of modern zoo design, but also to inform tourists about ways to reduce negative impacts on the environments that they visit, thereby diminishing the problems that can be caused by wildlife tourism (Ballantyne et al 2007).

Conclusions

It has been shown that animals, both domestic and non-domestic, can offer physical, emotional, and psychological benefits to us, and that we are capable of offering similar benefits to them. However, especially with wildlife interactions, it is important to have a balance because human interactions can cause harm to these species if precautions are not taken. Growing concerns about the current rates of animal depletion and extinction have inspired a new wave of interest in wildlife, and former perceptions of wildlife management have changed to encourage a system that values whole ecosystem relations, rather than how these species benefit or harm humans. Animals, both wild and domestic, have played an important role in our culture for thousands of years. Stories our relationships with non-human animals, and what these may represent, have captivated our minds over this time. Increasing urbanization has moved us away from environments in which we may directly encounter wild animals on a daily basis, but we are still exposed to them regularly through virtually all media.

Despite changing perceptions, however, there are still many threats to wildlife, including habitat loss and human encroachment. Without greater efforts to protect these animals and their habitats, our culture and potentially human health and wellness will suffer as well. Our

relationships with animals from wild to domestic seem to play an indispensable role in our welfare, but without further research, it is impossible to know how deeply we will be impacted by incipient ecological changes and potential disasters. Efforts should be taken to learn more about the interconnected relationships between humans and animals in order to educate people on the benefits of maintaining these connections and the livelihoods of the species that are now facing extinction.

Works Cited

Albrecht, M. C. 1954. The relationship of literature and society. *American Journal of Sociology*, 59(5): 425–436.

Ballantyne, R., Packer, J., Hughes, K., and Dierking, L. 2007. Conservation learning in wildlife tourism settings: lessons from research in zoos and aquariums. *Environmental Education Research*, 13(3): 367–383.

Bayne, K. 2002. Development of the human-research animal bond and its impact on animal well-being. *ILAR Journal*, 43: 4–9.

Beetz, A., Uvnäs-Moberg, K., Julius, H., and Kotrschal, K. 2012. Psychosocial and psychophysiological effects of human-animal interactions: The possible role of oxytocin. *Frontiers in Psychology*, 3: 1–15.

Bjerke, T., and Kaltenborn, B. P. 1999. The relationship of ecocentric and anthropocentric motives to attitudes toward large carnivores. *Journal of Environmental Psychology*, 19: 415–421.

Borkfelt, S. 2009. Colonial animals and literary analysis: The example of Kipling's animal stories. *English Studies*, 90 (5): 557–568.

Brent, L., and Belik, M. 1997. The response of group-housed baboons to three enrichment toys. *Lab. Anim.*, 31: 81-85.

Chamove, A.S., Hosey, G.R., and Schaetzel, P. 1988. Visitors excite primates in zoos. *Zoo Biol.*, 7: 359–369.

Chang, F. T., and Hart, L. H. 2002. Human-animal bonds in the laboratory: how animal behavior affects the perspectives of caregivers. *ILAR Journal*, 43: 10–18.

Claxton, A. M. 2011. The potential of the human-animal relationship as an environmental enrichment for the welfare of zoo-housed animals. *Applied Animal Behaviour Science*, 133 (1-2): 1–10.

Cook, S., and Hosey, G.R. 1995. Interaction sequences between chimpanzees and human visitors at the zoo. *Zoo Biol.*, 14: 431–440.

Diamond, J. M., Ashmole, N. P., and Purves, P. E. 1989. The present, past, and future of human-caused extinctions. *Philosophical Transactions of the Royal Society of London*, 325: 469-477.

Douglas, D. K. 2005. Benefits to pets from the human-animal bond: a study of pet owner behaviors and their relation to attachment. *Wichita State University*.

Friedmann, E. 1995. "The role of pets in enhancing human well-being : Physiological effects." *The Waltham Book of Human-Animal Interaction: Benefits and Responsibilities of Pet Ownership*, 33-54.

Galibert, F., Quignon, P., Hitte, C., and André, C. 2011. Toward understanding dog evolutionary and domestication history. *Comptes Rendus - Biologies*, 334: 190–196.

Gonyou, H.W., Hemsworth, P.H., and Barnett, J.L. 1986. Effects of frequent interactions with humans on growing pigs. *Applied Animal Behavioral Science*, 16: 269–278.

Goodall, J. 2010. *Through a Window: My Thirty Years with the Chimps of Gombe*. Boston: Mariner Books. Print.

Hemsworth, P. H., Coleman, G. J., Barnett, J. L., and Borg, S. 2013. Relationships between human-animal interactions and productivity of commercial dairy cows. *Journal of Animal Science*, 78: 2821–2831.

Herzog, H. 2002. Ethical aspects of relationships between humans and research animals. *ILAR Journal*, 43(1): 27–32.

Kellert, S. R., and Berry, J. K. 1987. Attitudes , knowledge , and behaviors toward wildlife as affected by gender. *Wildlife Society Bulletin*, 15(3): 363–371.

Keniger, L. E., Gaston, K. J., Irvine, K. N., and Fuller, R. A. 2013. What are the benefits of interacting with nature? *International Journal of Environmental Research and Public Health*, 10: 913–935.

Kipling, R. 1894. *The Jungle Book*. London: Macmillan. *Project Gutenburg*. Web. 15 Feb 2015.

Kurleto, M. 2014. Managing the wildlife tourism experience : Protecting of wild animals and safeguarding of the tourists. *Journal of Business and Economics*, 5(8): 1403–1412.

London, J. 1906. *White Fang*. New York: Dover, 1991. Print.

Lukas, K., and Ross, S. 2014. Naturalistic exhibits may be more effective than traditional exhibits at improving zoo-visitor attitudes towards African apes. *Anthrozoos*, 27: 435-455.

Manfredo, M., Teel, T., and Bright, A. 2003. Why are public values toward wildlife changing? *Human Dimensions of Wildlife*, 8: 287–306.

Margulis, S.W., Hoyos, C., and Anderson, M. 2003. Effect of felid activity on zoo visitor interest. *Zoo Biol.*, 22: 587–599.

Melville, Herman. 1851. *Moby Dick, or The Whale*. New York, Dover Thrift, 2003. Print.

Nagasawa, M., Mitsui, S., En, S., Ohtani, N., Ohta, M., Sakuma, Y., Onaka, T., Mogi, K., and Kikusui T. 2015. Oxytocin-gaze positive loop and the coevolution of human-dog bonds. *Science*, 348: 333-336.

Odberg, F. 1987. The influence of cage size and environmental enrichment on the development of stereotypies in bank voles (*Clethrionomys glareolus*). *Behavioral Processes*, 14: 155-173.

Orams, M. B. 2002. Feeding wildlife as a tourism attraction: A review of issues and impacts. *Tourism Management*, 23: 281–293.

Plyusnina, I., Oskina, I., and Trut, L. 1996. Selection of silver foxes for domestic behaviour with reference to their welfare. *Anim. Prod. Rev. Appl. Sci. Rep.*, 29: 17–21.

Price, A., Boeving, E., Shender, M., and Ross, S. Understanding the effectiveness of demonstration programs. *Journal of Museum Education*, 40: 46-54.

Quadros, S., Goulart, V., Passos, L., Vecci, M., and Young, R. 2014. Zoo visitor effect on mammal behaviour: Does noise matter? *Applied Animal Behaviour Science*, 156: 78-84.

Reade, L. S., and Waran, N. K. 1996. The modern zoo: how do people perceive zoo animals? *Applied Animal Behavior Science*, 47: 109-118.

Russow, L. M. 2002. Ethical implications of the human-animal bond in the laboratory. *ILAR Journal*, 43(33): 33–37.

Sekercioglu, C. H. 2002. Impacts of birdwatching on human and avian communities. *Environmental Conservation*, 29(3): 282–289.

Steffen, W., Crutzen, P. J., and McNeill, J. R. 2007. The Anthropocene: are humans now overwhelming the great forces of nature? *Ambio*, 36 (8): 614-621.

Swanagan, J. F. 2000. Factors influencing zoo visitors' conservation attitudes and behavior. *Journal of Environmental Education*, 31(4): 26.

Thompson, S. 1955. *Motif-Index of Folk-Literature : A Classification of Narrative Elements in Folktales, Ballads, Myths, Fables, Medieval Romances, Exempla, Fabliaux, Jest-books, and Local Legends*. Bloomington: Indiana University Press.

Tomas, S., Scott, D., and Crompton, J. 2002. An investigation of the relationships between quality of service performance, benefits sought, satisfaction and future intention to visit among visitors to a zoo. *Managing Leisure*, 7: 239–250.

U.S. Pet Ownership and Demographics Sourcebook. 2012. Schaumburg, IL: American Veterinary Medical Association.

UNESCO. 2015. "Prehistoric Sites and Decorated Caves of the Vézère Valley." *United Nations Educational, Scientific and Cultural Organization.*

Waiblinger, S., Boivin, X., Pedersen, V., Tosi, M. V., Janczak, A. M., Visser, E. K., and Jones, R. B. 2006. Assessing the human-animal relationship in farmed species: A critical review. *Applied Animal Behaviour Science*, 101(3): 185–242.

Walsh, F. 2009. Human-animal bonds I: the relational significance of companion animals. *Family Process*, 48(4): 462–481.

Whitehouse, J., Waller, B., Chanvin, M., Wallace, E., Schel, A., Peirce, K., Mitchell, H., Macri, A., and Slocombe, K. 2014. Evaluation of public engagement activities to rromote science in a zoo environment. *PLOS One*, 9: 1-14.

Wielebnowski, N., Fletchall, N., Carlstead, K., Busso, J.M., and Brown, J.L. 2002. Noninvasive assessment of adrenal activity associated with husbandry and behavioral factors in the North American clouded leopard population. *Zoo Biol.*, 21: 77–98.

Zalasiewicz, J., Williams, M., Smith, A., Barry, T. L., Coe, A. L., Bown, P. R., Brenchly, P., Gale, A., Gibbard, P., Gregory, F. J., Hounslow, M. W., Kerr, A. C., Pearson, P., Knox, R.,

Powell, J., Waters, C., Marshall, J., Oates, M., Rawson, P., and Stone, P. 2008. Are we now living in the Anthropocene? *GSA Today*, 18 (2): 4–8.

Zeppel, H., and Muloin, S. 2008. Conservation and education benefits of interpretation on marine wildlife tours. *Human Dimensions of Wildlife*, 13: 280–294.